Welcome to the ServSwitch™ Family!

Thank you for purchasing a BLACK BOX® ServSwitch™ Brand PS/2 Micro Extender model! We appreciate your business, and we think you'll appreciate the many ways that your enhanced keyboard/video/mouse system will save you money, time, and effort.

That's because our ServSwitch family is all about breaking away from the traditional, expensive model of computer management. You know, the one-size-fits-all-even-if-it-doesn't model that says, "One computer gets one user station, no more, no less." Why not a single user station (monitor, keyboard, and mouse) for multiple computers—even computers of different platforms? Why not a pair of user stations, each of which can control multiple computers? Why not multiple user stations for the same computer?

With our ServSwitch products, there's no reason why not. We carry a broad line of robust solutions for all these applications. Do you have just two PCs, and need an economical alternative to keeping two monitors, keyboards, and mice on your desk? Or do you need to share dozens of computers, including a mix of IBM® PC, RS/6000®, Apple® Macintosh®, Sun Microsystems®, and SGI™ compatibles among multiple users with different access levels? Does your switch have to sit solidly on a worktable and use regular everyday cables? Or does it have to be mounted in an equipment rack and use convenient many-to-one cables? No matter how large or small your setup is, no matter how simple or how complex, we're confident we have a ServSwitch system that's just right for you.

The ServSwitch™ family from Black Box—the one-stop answer for all your KVM-switching needs!

This manual will tell you all about your new ServSwitch™ Brand PS/2 Micro Extender, including how to install, operate, and troubleshoot it. For an introduction to the Extender, see **Chapter 2**. The Extender product codes covered in this manual are:

ACU3201A
ACU3209A
ACUMR02A
ACU3222A
ACU3228A
ACUMRA02A

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Disclaimer

While every precaution has been taken in the preparation of this manual, the manufacturer assumes no responsibility for errors or omissions. Neither does the manufacturer assume any liability for damages resulting from the use of the information contained herein. The manufacturer reserves the right to change the specifications, functions, or circuitry of the product without notice.

The manufacturer cannot accept liability for damage due to misuse of the product or due to any other circumstances outside the manufacturer's control (whether environmental or installation related). The manufacturer shall not be responsible for any loss, damage, or injury arising directly, indirectly, or consequently from the use of this product.

Cautions and Notes

The following symbols are used in this guide:

CAUTION. This indicates an important operating instruction that should be followed to avoid any potential damage to hardware or property, loss of data, or personal injury.

NOTE. This indicates important information to help you make the best use of this product.

FEDERAL COMMUNICATIONS COMMISSION AND CANADIAN DEPARTMENT OF COMMUNICATIONS

RADIO-FREQUENCY INTERFERENCE STATEMENTS

This equipment generates, uses, and can radiate radio-frequency energy, and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart B of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Shielded PC-equipment cables must be used with this equipment to maintain compliance with radio frequency energy emission regulations and ensure a suitably high level of immunity to electromagnetic disturbances.

This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par le Ministère des Communications du Canada.

EUROPEAN UNION DECLARATION OF CONFORMITY

WARNING!

This is a class A product. In a domestic environment, this product may cause radio interference, in which case the user might be required to take adequate remedial measures.

This product complies with the following harmonized standards:

EN55022:1998

EN55024:1998

EN61000-3-2:2001

EN61000-3-3:2000

EN60950-1:2000

When used in environments that have high levels of electromagnetic interference or excessive power ground noise, you may experience disturbances to video and/or data transmission. If this is the case, please refer to the Troubleshooting section of the User Guide for further information, or contact Technical Support.

To maintain compliance, only use cables supplied (or recommended) for use with this product. In electrically noisy environments, the use of shielded (STP/FTP) rather than unshielded (UTP) interconnection cable is recommended.

NORMAS OFICIALES MEXICANAS (NOM)

ELECTRICAL SAFETY STATEMENT

INSTRUCCIONES DE SEGURIDAD

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.
5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc..
6. El aparato eléctrico debe ser usado únicamente con carritos o pedestals que sean recomendados por el fabricante.
7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.
10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.
11. El aparato eléctrico deberá ser connectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.
12. Precaución debe ser tomada de tal manera que la tierra fisica y la polarización del equipo no sea eliminada.
13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.

14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.
15. En caso de existir, una antena externa deberá ser localizada lejos de las lineas de energia.
16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.
17. Cuidado debe ser tomado de tal manera que objectos liquidos no sean derramados sobre la cubierta u orificios de ventilación.
18. Servicio por personal calificado deberá ser provisto cuando:

    A: El cable de poder o el contacto ha sido dañado; u

    B: Objectos han caído o líquido ha sido derramado dentro del aparato; o

    C: El aparato ha sido expuesto a la lluvia; o

    D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o

    E: El aparato ha sido tirado o su cubierta ha sido dañada.

Safety Precautions and Installation Guidelines

To ensure reliable and safe long-term operation please note the following installation guidelines:

- Do not use to link between buildings.
- Only use in dry, indoor environments.
- If the building has 3-phase AC power, try to ensure that equipment connected to the Local and Remote units is on the same phase.
- Try not to route the CATx link cable alongside power cables.
- Ensure that the system connected to the Local unit is connected to power ground.
- Ensure that the monitor connected to the Remote unit is connected to power ground and does not use an isolated power supply.
- The Remote unit and any power supplies can get warm. Do not situate them in an enclosed space without any airflow.
- Do not place the power supply directly on top of the Remote unit.
- This product is not suitable for use in isolated medical environments.

To safeguard against personal injury and avoid possible damage to equipment or property, please observe the following:

- **Only use power supplies originally supplied with the product or manufacturer-approved replacements. Do not attempt to dismantle or repair any power supply. Do not use a power supply if it appears to be defective or has a damaged case.**
- **Connect all power supplies to grounded outlets. In each case, ensure that the ground connection is maintained from the outlet socket through to the power supply's AC power input.**
- **Do not attempt to modify or repair this product, or make a connection from the CATx link interface (RJ45) to any other products, especially telecommunications or network equipment.**

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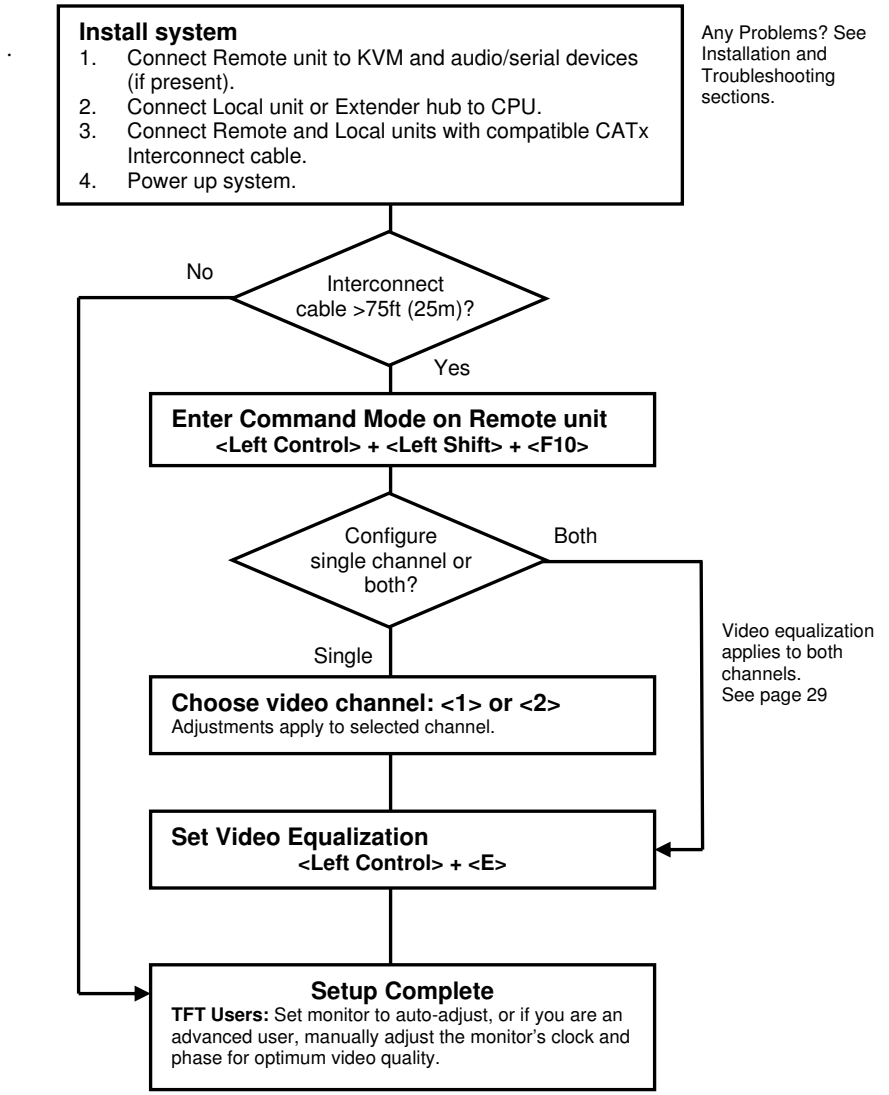
1. Quick Setup

This section briefly describes how to install your KVM extender system and optimize the video signals. Unless you are an experienced user, we recommend that you follow the full procedures described in the rest of this manual. Refer to the command summary on the next page when following this procedure.


Install system
1. Connect Remote unit to KVM and audio/serial devices (if present).
2. Connect Local unit or Extender hub to CPU.
3. Connect Remote and Local units with compatible CATx Interconnect cable.
4. Power up system.
Any Problems? See Installation and Troubleshooting sections.
No
Interconnect cable >75ft (25m)?
Yes
Enter Command Mode on Remote unit
<Left Control> + <Left Shift> + <F10>
Configure single channel or both?
Both
Single
Video equalization applies to both channels.
See page 29
Choose video channel: <1> or <2>
Adjustments apply to selected channel.
Set Video Equalization
<Left Control> + <E>
Setup Complete
TFT Users: Set monitor to auto-adjust, or if you are an advanced user, manually adjust the monitor's clock and phase for optimum video quality.

1.1 Command Summary

By using a specific 'hot' key sequence, you can put the Remote console keyboard into a Command Mode. From this, you can use various keys and key combinations to tune the video signal and generally configure the extender system. The following table summarizes the 'hot' key command sequences used in system configuration and video tuning (see page 28).

Command Mode	
Enter Command Mode*	**<Left Control> + <Left Shift> + <F10>**
Exit Command Mode & Save*	**<ESC>**
Exit Command Mode Without Save*	**<Left Control> + <ESC>**
Video Channel Selection	
Select Channel For Adjustment	**<1>, <2>**
Select BOTH Video Channels	**<0>**
Reset Commands	
Reset Mouse and Keyboard*	**<F1>**
Mouse Recovery*	**<F3>**
Set Extender To Default State*	**<Left Control> + <F9>**
Other Commands	
Toggle Private Mode*	**<Scroll Lock>**
Toggle Video Blanking State at other console*	**<Left Control> + <Scroll Lock>**
Disable DDC Emulation	**<Left Control> + <F2>**
Enable DDC Emulation	**<F2>**
Transfer DDC from monitor to Local Unit	**<Left Control> + <D>**

* Commands also available at Local console in Dual Access Kits: ACU3209A and ACU3228A (see page 34).

2. Overview

2.1 Introduction

The ServSwitch™ Brand PS/2 Micro Extender Series enables two channels of high-resolution video, PS/2 keyboard and mouse, and, optionally, stereo audio and serial port signals to be communicated up to 150ft (50m) over CATx (Category 5, 5e, 6 or higher) UTP/STP 4-pair cable.

A basic KVM extension system comprises a *Local* unit (transmitter) and a *Remote* unit (receiver). The Local unit connects directly to the computer (or a KVM switch system) using the supplied cable(s). The user *console* (keyboard, mouse and monitors) attaches to the Remote unit. The Remote and Local units communicate video and data information along the connecting CATx cables (see Figure 1).

Within the product range, models are available with combinations of the following:

- Audio transmission: bi-directional stereo audio (16-bit digitized).
- Serial transmission: transparent serial COM port (to 19.2Kbps).
- Dual access: allowing a second user console at the Local unit.

2.2 Glossary

The following terms are used in this guide:

CATx	Any Category 5, 5e, 6 or higher cable.
PSU	The desktop power supply.
KVM	Keyboard, Video and Mouse.
Console	A keyboard, monitor, and mouse, plus optional serial/audio devices.
Dual Access	A system allowing connection of Local and Remote user consoles.
Single Head	An extender system that supports one monitor only.
Dual Head	An extender system that supports two monitors.

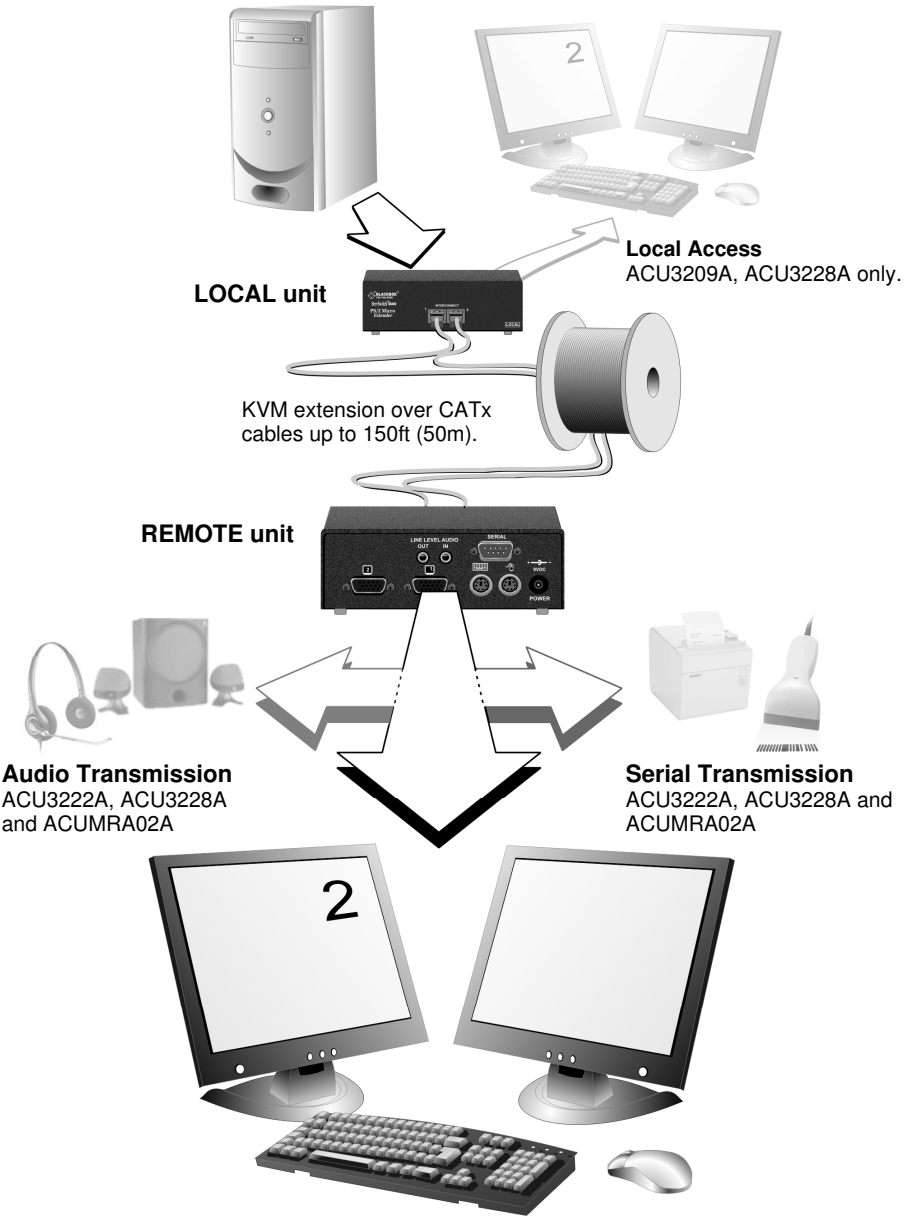


Figure 1 **KVM extender system**

2.3 Features

Members of the ServSwitch™ Brand PS/2 Micro Extender Series offer the following features:

- Supports high video resolution for use with TFT displays:
  1600x1200@75Hz up to 50m
- All control and video tuning made through attached keyboard.
- Settings stored in EEPROM memory.
- Local and Remote units are flash-upgradeable.
- Emulated DDC (Display Data Channel) on both video channels
  Extender Local unit emulates a universal monitor; ensures compatibility with multi-head graphics cards
- Transparent DDC
  Remote unit reads DDC table from attached monitor, transfers and stores data in Local unit to support non-standard displays.
- Dual-Head local access
  (ACU3209A and ACU3228A only)
- Private Mode on dual-access models allows users to lock out other console. Monitor on locked console can be enabled or blanked.
  (ACU3209A and ACU3228A only)
- Status indicator LEDs on each RJ45 port.
- Small footprint chassis.
- Rack mount option: plate available to mount three units across 1U.
- External PSU Overvoltage protection
  Extender unit will not operate if an incorrect PSU is connected.
- Surge-protected CATx interfaces
- 5V universal PSU (supplied for Remote unit)
- Optional 5V PSU connector on Local unit. Local units are normally powered directly by the connected PC (or switch)
- Transparent serial port enables any serial device to be extended (up to 19.2K Baud). The serial port may be used to extend one device (requiring handshaking lines), or up to three simple serial devices (no handshaking).
  ACU3222A, ACU3228A and ACUMRA02A only
- Bi-directional stereo audio (16-bit digitized) support on certain models enables high-quality, low-noise audio extension.
  ACU3222A, ACU3228A and ACUMRA02A only

2.4 Product Range

There are six products in the range:

Dual Video Channel Kit (Standard)	
ACU3201A	Dual Video Channels, PS/2 KB & Mouse Local Unit (Single Access) + Remote Unit
ACU3209A	Dual Video Channels, PS/2 KB & Mouse Local Unit (Dual Access) + Remote Unit
Dual Video Channel Kit (Audio)	
ACU3222A	Dual Video Channels, PS/2 KB & Mouse, Serial, Stereo Audio Local Unit (Single Access) + Remote Unit
ACU3228A	Dual Video Channels, PS/2 KB & Mouse, Serial, Stereo Audio Local Unit (Dual Access)+ Remote Unit
Dual Video Remote Units	
ACUMR02A	Dual Video Channels, PS/2 KB & Mouse
ACUMRA02A	Dual Video Channels, PS/2 KB & Mouse, Serial, Stereo Audio

2.5 Compatibility

Interface Compatibility

- **PS/2 Keyboard:** Compatible with all standard keyboards. Certain keyboards with enhanced features may also be supported with custom firmware.
- **PS/2 Mouse:** Compatible with all standard 2-button, 3-button and wheel mice. To connect to a PC which does not have a PS/2 mouse port, an active serial converter is required – Model No: AC244A.
- **Audio:** Input and output are line-level: 4V Pk-Pk maximum. Amplified speakers are required. A microphone may be directly connected to the Remote unit. Pullup resistor provides bias for condenser microphone. Option to set microphone amplication to +17dB.
- **Serial:** Transparent up to 19.2K Baud (38.4K operation may be possible with some devices). The following serial signals are extended: TX, RX, RTS, CTS, DTR, DSR. In rare cases, a wiring adaptor may be required to transfer RI and DCD.
- **Video:** VGA to UXGA. Separate sync, composite sync, or sync-on-green. Maximum resolution and refresh rates depend on cable length and cable type (see **Appendix G: Specifications**, page 50).

Extender Compatibility

The ServSwitch™ Brand PS/2 Micro Extender Series offers enhanced performance while maintaining complete compatibility with existing ServSwitch™ standalone and rack mount CAT5 extenders.

You can use products belonging to the same family in any combination. However, it is not possible to mix Standard and Audio products within a system except for video only applications. PS/2 Micro Extender units are not currently compatible with SUN (ACU1004A, ACU1005A) or Serial-only products (ACU1002A, ACU1008A, ACUSREM, ACU1006SRA, ACU1006DSRA).

Standard Family		*Audio Family*	
ACU3201A, ACU3209A, ACUMR02A		**ACU3222A, ACU3228A, ACUMRA02A**	
ACU1001A	ACU1009A	ACU1022A	ACU1028A
ACU3001A	ACU3009A	ACU3022A	ACUVREM
ACU1049A	ACUMREM	ACUWREM	ACU1006VRA
ACUREM	ACUREMSW	ACU1006DVRA	ACU1006MRVA
ACU1006RA	ACU1006DRA	ACU2022A	ACU2028A
ACU1012RA	ACU1006MRA	ACU2222A	ACU2222A-R2
ACU2001A	ACU2009A	ACU2228A	ACURA001A
ACU2201A	ACUR001A		ACURA002A
ACU2201A-R2	ACU2209A		ACURA004A
ACUR002A	ACUR004A		

2.6 How to Use This Guide

This guide describes the installation and configuration of the ServSwitch™ Brand PS/2 Micro Extender Series. Although the connection and operation of the system is relatively straightforward, you should consider the following before getting started:

Connection & Compatibility

If you have purchased an *Extender Kit*, this will contain all the cables required to connect the Local unit to your PC or KVM switch. The Remote console (keyboard, monitor and mouse) and any audio and serial equipment connects directly to the Remote unit.

If you have purchased a *Remote Unit*, ensure that it is compatible with your Local unit (see **Compatibility**, page 16).

For information about connection and installation, see **Installation**, page 19.

Interconnection Cable

You will need CATx (any category 5, 5e, 6 or higher) cable, terminated with RJ45 plugs, to connect the Local and Remote units (see **Interconnection Cable Requirements**, page 20).

Adjusting Video

Video signals become distorted when transmitted over CATx cables. To get the best from your extender system, it is *essential* that you adjust the Remote unit to optimize the video image quality:

- For experienced users, there is a **Quick Setup** section at the start of this guide (see page 10).
- For the full procedure, see **Remote Unit Configuration & Operation**, page 28.

3. Installation

For first-time users, we recommend that you carry out a test placement, confined to a single room, before commencing full installation. This will allow you to identify and solve any cabling problems, and experiment with the KVM extender system more conveniently.

3.1 Package Contents

You should receive the following items in your extender package. If anything is missing, please refer to Appendix F to obtain Technical Support.

- Extender Remote unit.
- 5-VDC universal power supply for Remote unit.
- Extender Local unit.
  Only included in extender kits.
- KVM CPU combination cable (1.0m) with PS/2 (6-pin mini-DIN male-to-male) keyboard and mouse connectors, VGA video (HD15 male) connector, and 25-way (DB25 Female) extender connector.
  Not included with Remote units.
- CPU video cable (1.0m) with VGA video (HD15 male) connectors.
  Not included with Remote units.
- Serial cable (1.0m, one DB9 male connector, one DB9 female connector, straight-through connections).
  Models: ACU3222A and ACU3228A only.
- Dual audio cable (1.0m, 3.5mm stereo plugs).
  Models: ACU3222A and ACU3228A only.
- IEC AC Power Cord.
- User Guide.

3.2 Interconnection Cable Requirements

To connect the Local and Remote units you will need CATx (any category 5, 5e, 6 or higher) cable terminated with RJ45 plugs.

Interconnect cables must be solid-core type. Stranded patch cable will give poor results over longer distances. The pairing of the cable and pinning of its connectors should normally be in accordance with EIA-568B (see **Appendix D: Cable Pinning**, page 46).

One CATx cable is required for each video channel.

- The *Primary* interconnect cable connects INTERCONNECT Port 1 on the Local and Remote units. This carries the main video channel and all data (plus audio/serial).
- The *Secondary* CATx cable (connected to INTERCONNECT Port 2) carries the second video channel.

In order to send Keyboard, Mouse, Audio and Serial signals to the PC, the Primary interconnect must be connected.

The Primary interconnect does not have to be connected in order to use the keyboard attached to the Remote unit for setup. However, if the Primary interconnect is disconnected, the keyboard cannot be used for configuration for 15 seconds after disconnection (to maintain data integrity).

*With some cables, video performance may be improved by using a crossover patch cable at each end or an alternative RJ45 pin-out (see **Appendix D: Cable Pinning**, page 46).*

3.3 Remote Unit Installation

To install a Remote unit:

1. Switch off all devices.

2. Connect your keyboard, monitor(s) and mouse to the Remote unit as shown in Figure 2.

   These ports may also be attached to the CPU side of a KVM switch in order to have a Remote CPU. However, if you are attempting to use the extender between cascaded KVM switches this may not work. Please contact Technical Support to discuss your application.

3. If appropriate, connect audio equipment and serial devices. Connect the audio cables as follows:

RemoteUnit	*Audio Device*
Audio Out	Speakers
Audio In (MIC)	Microphone

   See **Appendix E: Audio/Serial Ports**, page 47 for further information.

4. Connect the Primary CATx cable to the INTERCONNECT (1) socket on the front of the Remote unit. If required, connect the Secondary CATx cable to the INTERCONNECT (2) socket on the front of the Remote unit (see Figure 3).

5. Connect the 5V power supply to power the unit.

   Only use the power supply originally supplied with this equipment or a manufacturer approved replacement.

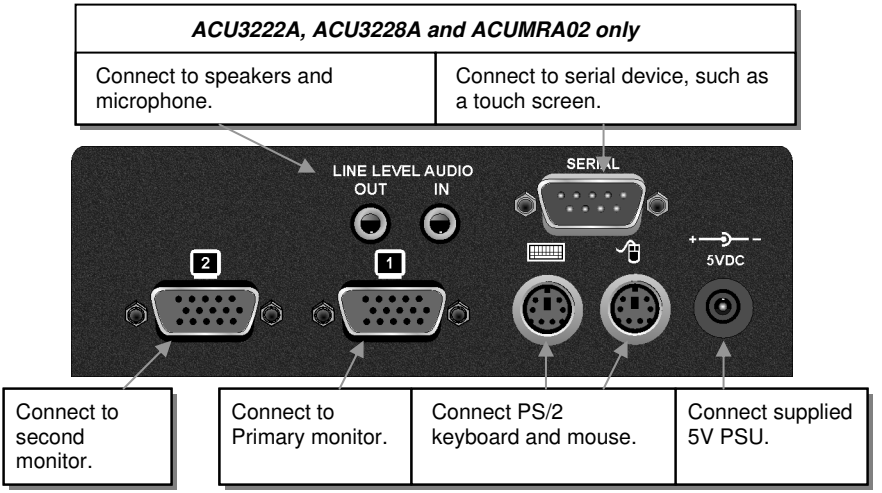
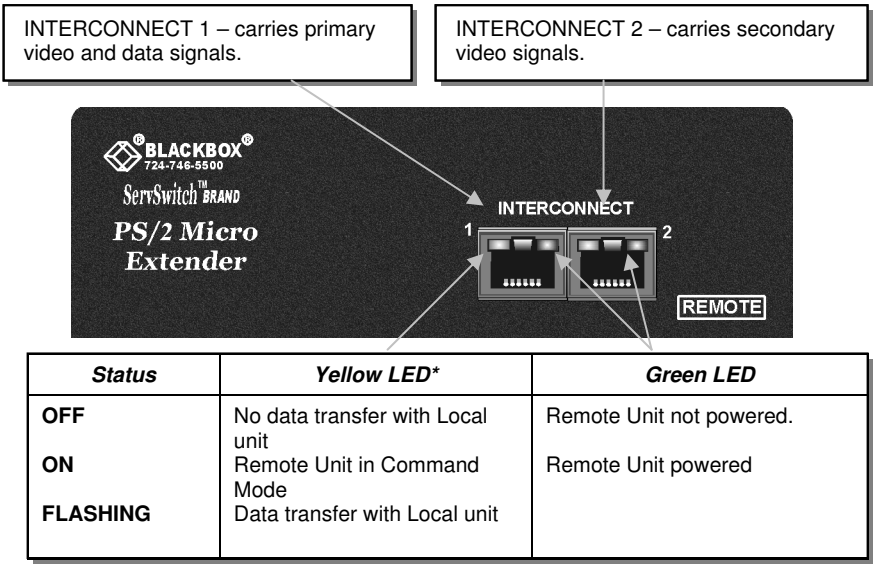


Figure 2 Remote Unit – rear view



Status	*Yellow LED**	*Green LED*
OFF	No data transfer with Local unit	Remote Unit not powered.
ON	Remote Unit in Command Mode	Remote Unit powered
FLASHING	Data transfer with Local unit	

* Yellow LED active on primary INTERCONNECT socket (Channel 1) only

Figure 3 Remote Unit - front view

3.4 Local Unit Installation

To install a Local unit:

1. It is recommended that the PC and other devices are switched off before connection.
2. Using the supplied CPU KVM cable(s), connect the keyboard, monitor(s) and mouse connectors on the computer (or KVM switch) to the corresponding connectors on the Local unit as shown in Figure 4.
   Ensure that you attach the keyboard and mouse connectors to the correct ports. The keyboard connector is purple; the mouse connector is green.

   If your PC does not have a PS/2 mouse port, an active serial converter will be required - Model No: AC244A.
3. If you have a dual access system, connect the keyboard, mouse and monitor for the Local console to the appropriate ports on the Local unit. The ports may also be used to feed into a KVM switch.
4. If you have an audio and serial enabled system, connect the audio cables between the computer and Local unit as follows:

Computer	***Local Unit***
Audio Out (green)	Audio In
Audio In/Microphone (pink/blue)	Audio Out

5. If appropriate, connect the supplied serial cable between the serial port on the computer and the Local unit.
6. Connect the CATx cables from the Remote unit to the corresponding INTERCONNECT ports (1&2) on the Local unit (see Figure 5).
7. Power up the PC.

   The Local unit normally takes power through the PC keyboard port. In video only applications, this connection is not used and an external power supply is required (PSU1006E). Please contact Technical Support for more details.

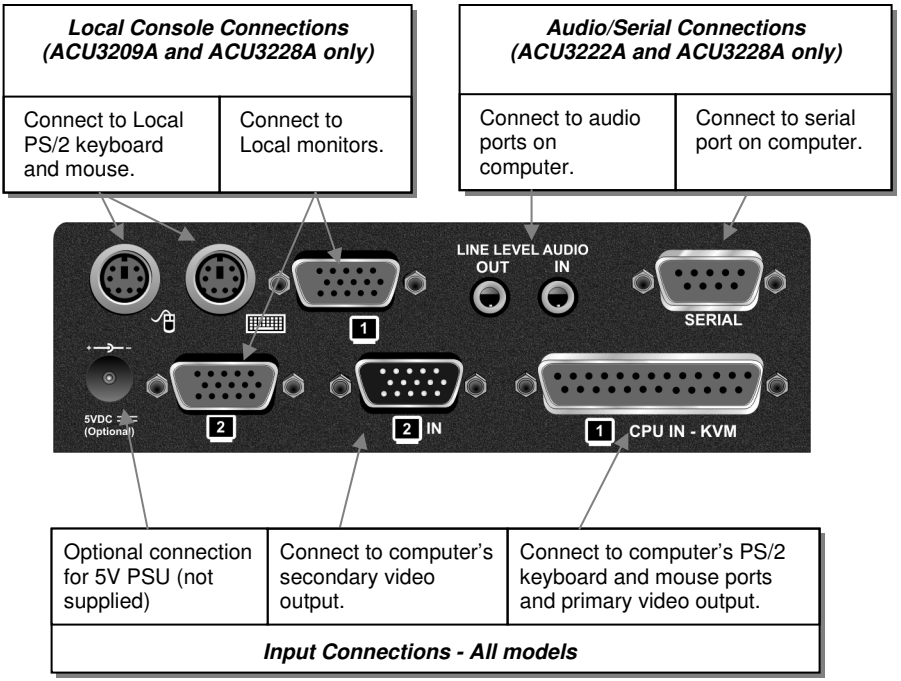
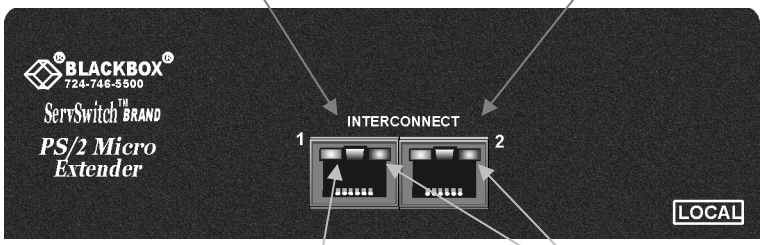

Local Console Connections (ACU3209A and ACU3228A only)
Connect to Local PS/2 keyboard and mouse.
Connect to Local monitors.
Audio/Serial Connections (ACU3222A and ACU3228A only)
Connect to audio ports on computer.
Connect to serial port on computer.
LINE LEVEL AUDIO
OUT
IN
SERIAL
1
5VDC
(Optional)
2
2 IN
1 CPU IN - KVM
Optional connection for 5V PSU (not supplied)
Connect to computer's secondary video output.
Connect to computer's PS/2 keyboard and mouse ports and primary video output.
Input Connections - All models

Figure 4 Local Unit - rear view

INTERCONNECT 1 – carries primary video and data signals. Connect to CATx cable from INTERCONNECT 1 port on Remote unit.	INTERCONNECT 2 – carries secondary video signals. Connect to CATx cable from INTERCONNECT 2 port on Remote unit.



Status	*Yellow LED*	*Green LED**
OFF	No data transfer with Remote unit	Local Unit not powered
ON	Local Unit in Command Mode	Local Unit powered
FLASHING	Data transfer with Remote unit	

Figure 5 Local Unit – front view

3.5 Connection to Rackmount Hub Local Units

Remote units are compatible with CAT5 KVM Extender Local Hubs belonging to the same family:

Family	*Remote Units*	*Compatible Local Rack Hubs*
Standard	ACUMR02A	ACU1006RA, ACU1006DRA, ACU1012RA
Audio	ACUMRA02A	ACU1006VRA, ACU1006DVRA *Video only:* ACU1006RA, ACU1012RA

The following features may not be available when Remote units are used with these Rack Hubs: DDC Emulation (see page 32), DDC Transfer (see page 33), Private Mode Video Blanking Toggle (see page 31). Please contact Technical Support.

You can connect adjacent hub ports to a Remote Unit to transmit the primary video/data and secondary video signals (see Figure 6).

Additional video channels do not require the Extender Hub to be of the same family. For example, an ACU1012RA could be efficiently used to transmit multiple secondary video channels to ACUMRA02A units, see Figure 7 in **Appendix A: Example Applications**.

Individual Rack Hub operation is not covered in this guide. Please refer to the documentation supplied with your Rack Hub unit.

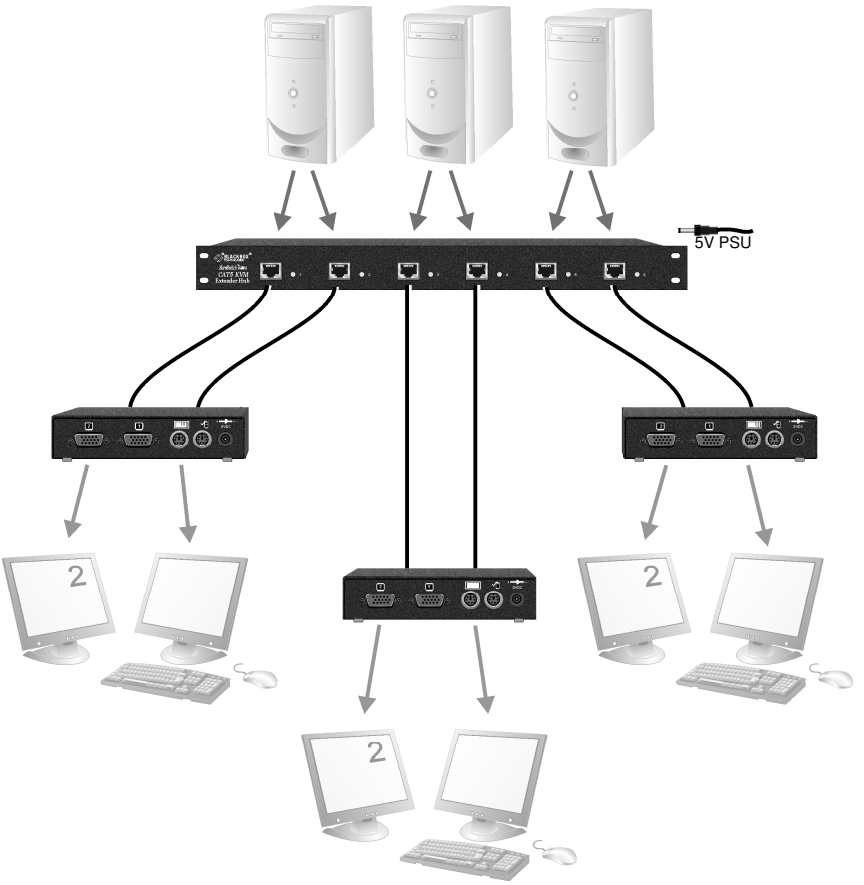


Figure 6 **ACU1006RA rack used with ACUMR02A Remote Units to extend dual video**

4. Remote Unit Configuration & Operation

This section describes how to optimize the video signal, configure the Extender system and operate the Remote unit.

For details about flash upgrading and external configuration see **Appendix C: Remote Unit: Flash Upgrading & External Configuration,** page 45.

For more information about serial/audio port operation, see **Appendix E: Audio/Serial Ports**, page 47.

4.1 Command Mode

During normal use, the Remote console keyboard functions in the usual manner. However, by using a specific 'hot' key sequence, you can set the keyboard into a Command Mode. From this, you can use various keys and key combinations to tune the video signal and generally configure the extender system.

To enter Command Mode:

1. Ensure that you have installed and powered up the system according to the instructions in Section 3.
2. Press the following key combination on the Remote keyboard:

<Left Control> + <Left Shift> + <F10>

From Command Mode you can use one or more of the 'hot' key sequences shown on page 11 to configure the system. The next section gives a full description of the video optimization procedure.

To exit Command Mode:

- Press **<Esc>** to exit Command Mode and save the configuration settings, or
- Press **<Left Control> + <Esc>** to exit Command Mode without saving changes made in the current session.

The Remote unit automatically exits Command Mode after 30 sec of inactivity, saves all settings to EEPROM and returns normal function to the keyboard.

Status LEDs in Command Mode

In Command Mode, the Remote unit:

- Illuminates the yellow Interconnect 1 LED continuously (see Figure 5).
  Note. The Yellow LED on Interconnect 2 is not lit.
- Flashes the status LEDs (Num Lock, Caps Lock, Scroll Lock) on the connected keyboard to indicate the selected video channel (to which adjustments will be applied).

The number of flashes indicates the selected video channel:

Keyboard LED flashes	***Video channel***
1	Channel 1
2	Channel 2
Slow Flashes	Both channels (*Channel 0*)

4.2 Adjusting Video

PS/2 Micro Extender Remote units incorporate video equalization circuitry, allowing you to compensate for the loss in image quality that occurs when video signals are transmitted along CATx cables. At the factory, Remote units are configured to optimize the video signals for Interconnect cables up to 75ft (25m) in length.

If you intend to use cables of 75–150ft (25-50m) in length:

1. Ensure that you have installed and powered up the system according to the instructions in Section 3.
2. Enter Command Mode by pressing the following key combination on the Remote console keyboard:

   <Left Control> + <Left Shift> + <F10>
3. By default, both channels are selected for adjustment and this is indicated by slow flashing of the keyboard status LEDs (Num Lock, Caps Lock, Scroll Lock). If you want to select a single channel press the corresponding numbered key:

Video channel	*Command*	*Keyboard Status LED action*
Channel 1	**<1>**	Single flashes
Channel 2	**<2>**	Double flashes
Both channels	**<0>** (default)	Slow single flashes

4. Press the following key combination to change the video equalization setting:

   <Left Control> + <E>

   Note: This command toggles the video equalization setting; repeat the procedure to revert to the original setting for a shorter interconnection cable length [<75ft (25m)].
5. **If you are using one or more flat panel monitors in the Remote console, carry out auto-adjustment as described in the monitor's documentation. Sometimes manual adjust of clock and/or phase is also required for optimum results and minimization of jitter.**

Technical Note: *This video compensation does not correct color separation (skew). Although skew can be an issue on some CATx cables, it would not normally be observed on cables <150ft (50m). Even so, we still recommend the use of low skew cables with PS/2 Micro Extenders. You can check whether skew is a problem in your system by viewing the test card at:*

http://www.blackbox.com/tech_support/ts_upgrades/ts_ss.html

4.3 Other Remote Configuration & Operation Options

The ServSwitch™ Brand PS/2 KVM Micro Extender Series has additional commands to reset the keyboard and mouse, to restore the factory default configuration, change DDC settings, and to initiate and control a Private mode session (*Dual Access models only*).

Command	*Key Sequence*
Reset Mouse and Keyboard	***<F1>***
Resets the Remote console's keyboard and mouse and then automatically exits Command Mode. You may need to do this if you have hot-plugged a keyboard or mouse and it has not initialized correctly.	
Mouse Recovery	***<F3>***
Use this command if you experience erratic movement of the mouse pointer or you have lost mouse movement after hot plugging the Local unit into the CPU. In the case of erratic mouse movement, you may need to enter the command a number of times to re-synchronize the mouse signal. Alternatively, stop moving the mouse for a few seconds and the operating system's mouse drivers may automatically re-synchronize the signal. If the Local unit has been hot-plugged, this command will issue a request to the OS to initialize the mouse. *Use this command with care.*	
Set Extender To Default State	***<Left Control> + <F9>***
Sets ALL extender settings (video, configuration & DDC) back to the factory defaults and then exits Command Mode.	
Toggle Remote Unit Private Mode	***<Scroll Lock>***
Use this command to begin or end a Private Mode session at the Remote console (see page 32).	
Toggle Local Video Blanking State	***<Left Control> + <Scroll Lock>***
Use this command to determine whether the Local console monitor will be blanked (default setting) or enabled during a Private mode session at the Remote console.	
Disable DDC Emulation	***<Left Control> + <F2>***
By default, the Local unit provides DDC emulation on both video channels. Use this command to disable DDC emulation (see page 32).	
Enable DDC Emulation	***<F2>***
Use this command to restore DDC emulation.	
Transfer DDC to Local Unit	***<Left Control> + <D>***
Read DDC from monitor connected to Remote Unit video channel 1 and apply to selected video channels in Local Unit (see page 33).	

Private Mode

On dual access systems, a user at one console can lock out the other console by triggering a 'Private Mode' function. This prevents the other console from being used even if the two-second inactivity timeout period expires.

To indicate that the Private Mode session is active, the extender system:

- Slowly flashes the Scroll Lock LED on the user's keyboard.
- Illuminates all three LEDs on the other console's keyboard.
- Locks the other console's keyboard and mouse.
- Displays a blank image on the other console's monitor. If you want the other console monitor(s) to remain active during Private Mode sessions, use the **Toggle Video Blanking State** command.

To cancel the Private Mode, enter Command Mode again and press **<Scroll Lock>**. This command also closes Command Mode.

DDC Emulation

Modern graphics cards use VESA DDC (Display Data Channel) to identify the capabilities of connected monitors. Some cards will not operate correctly unless they communicate with a DDC-enabled monitor.

By default, a PS/2 Micro Extender Local Unit emulates a universal monitor (on both channels) and reports that it is capable of all standard screen resolutions and refresh rates. This ensures that the vast majority of graphics cards and monitors should operate correctly with the extender system.

The DDC emulation can be optionally disabled but this would only be required in special applications.

It is also possible that the default DDC emulation may not report a non-standard graphics mode, for example, if an HDTV monitor is connected. In this case, the DDC from the remote monitor(s) may be read and stored in the Local Unit using the Transfer DDC command (see page 33).

In addition, the default DDC emulation is flash-upgradeable (see page 45).

Always reboot Windows after adjusting a DDC parameter.

Transferring DDC Information

To support non-standard screen settings or other features, it is possible to read and store DDC information into the Local Unit directly from the monitors connected to the Remote Unit. You only need to carry out this procedure once; the Extender Units store the DDC information in non-volatile memory and restore it at power-up.

1. Ensure that you have installed and powered up the system according to the instructions in Section 3.
2. Connect the monitor to the 'monitor 1' socket on the Remote Unit (see Figure 4).
3. Enter Command mode (see page 28).
4. If you want to apply the monitor's DDC settings to BOTH video channels, continue to step 6.
5. Select the video channel to which you want to apply the DDC settings (see page 30) by pressing either **<1>** or **<2>**.
6. Press the key combination:

   <Left Control> + <D>

7. The DDC information is read from the monitor and applied to the selected video channel(s) in the Local unit. This may take a few seconds. The Remote console keyboard LEDs flash twice to indicate a successful transfer.

Always reboot Windows after adjusting a DDC parameter.

5. Local Unit Operation

5.1 Overview

For more information about serial/audio port operation, see **Appendix E: Audio/Serial Ports**, page 47.

Keyboard and Mouse Emulation

Local units have keyboard and mouse emulation. The attached PC operates normally without requiring a keyboard or mouse to be attached to either the Remote or Local units (in the case of a dual access system). You can therefore replace any keyboard or mouse attached to the extender system without disrupting the operation of the computer.

Power

Local units may require an external 5V PSU (PSU1006E):

- For video only applications.
- If the PC cannot provide sufficient power through the keyboard connection.

5.2 Dual Access Systems

ACU3209A and ACU3228A models offer dual access from consoles at both Remote and Local units. This operates on a first-come, first-served basis. When one console is in use, the system blocks out the other console until there is no keyboard or mouse use at the active console for two seconds. Both monitors show the current activity on the computer irrespective of which console is in use.

Only Reset and Private Mode commands are available at the Local unit. If you want to configure the Extender system (for example, change DDC emulation) or tune the video signal, see page 28; these commands can only be issued from the Remote console.

To enter these commands:

1. Press and release the initial 'hot' key sequence.

   <Left Control> + <Left Shift> + <F10>

2. Press and release the command key.

Local Console Commands

After pressing the initial 'hot' key sequence (***<Left Control> + <Scroll Lock> + <F10>***) on the Local keyboard, you can issue a number of commands by pressing additional keys. These commands allow you to control a Private mode session at the Local console, reset the keyboard and mouse or restore the Local Unit's factory default settings.

Command	*Key Sequence*
Toggle Local Unit Private Mode	***<Scroll Lock>***
ACU3209A, ACU3228A only Use this command to begin or end a Private Mode session at the Local console (see page 32).	
Toggle Remote Video Blanking State	***<Left Control> + <Scroll Lock>***
ACU3209A, ACU3228A only Use this command to determine whether the Remote console monitor will be blanked (default setting) or enabled during a Private mode session at the Local console (see page 32).	
Reset Local Keyboard and Mouse	***<F1>***
Resets the Local console's keyboard and mouse. You may need to do this if you have hot-plugged a keyboard or mouse and it has not initialized correctly.	
Mouse Recovery	***<F3>***
Use this command if you experience erratic movement of the mouse pointer or you have lost mouse movement after hot plugging the Local unit into the CPU. In the case of erratic mouse movement, you may need to enter the command a number of times to re-synchronize the mouse signal. Alternatively, stop moving the mouse for a few seconds and the operating system's mouse drivers may automatically re-synchronize the signal. If the Local unit has been hot-plugged, this command will issue a request to the OS to initialize the mouse. *Use this command with care.*	
Exit Command Mode and Save	***<Esc>***
Exit Command Mode and save all settings to EEPROM.	
Set Local Unit to Default State	***<Left Control> + <F9>***
Restore Local Unit factory defaults (configuration and DDC).	

6. Troubleshooting

6.1 Video

The image is not sharp, or is badly smeared.

Have you adjusted the video equalization? Follow the instructions on page 30.

Check the Interconnect cable between the Remote and Local units. Is it of the recommended type (see page 20)? Is it intact along its entire length and securely connected at both ends? Is it wired correctly (see page 30)?

Ensure that all video connections throughout the system are attached securely.

Are you using an LCD panel? You need to adjust its clock and/or phase.

Colors appear to be separated and there are colored borders on text and icons.

Check the Interconnect cable between the Remote and Local units. Is it a recommended 'low skew' type (see page 20)? Is it intact along its entire length and securely connected at both ends? Is it wired correctly (see page 46)?

You can check whether skew is a problem in your system by viewing the test card at: **http://www.blackbox.com/tech_support/ts_upgrades/ts_ss.html**.

I only need video extension – not keyboard or mouse - but I can't get a picture.

Have you powered the Local unit? The Local unit gets its power from the CPU through the keyboard connection and it will not operate without it. Use an external 5V PSU as described on page 34.

The monitor sometimes goes blank for a second or two.

Check that the interconnect cable is not routed near power lines or other sources of electrical interference. Use shielded STP/FTP cable instead of UTP cable and ensure the shield connection is maintained between the Extender units.

Check system grounding.

If this is a persistent problem, contact Technical Support.

The PC won't boot into the correct graphics mode.

Check that DDC Emulation is enabled (see page 32). If you are using a non-standard resolution, transfer the monitor's DDC information to the Local Unit (see page 33).

Jitter is evident on video.

Adjust the clock and/or phase on your flat-panel. Contact Technical Support if this fails to improve the situation.

Are you testing a system using a coiled drum of CATx cable? Try uncoiling the cable. If this solves the video jitter, you should not have a problem after full installation.

The image is not stable and is blanking regularly.

Re-power the Remote unit.

Can the extender be used with RGB video?

Yes.

6.2 Keyboard & Mouse

When I am typing, I get wrong or missing characters on the screen.

Your keyboard may be in the wrong mode. Use the appropriate commands to reset the keyboard and mouse as described in the sections covering Local and Remote operation.

The PC comes up with 'keyboard error'.

Press <F1> or <ESC>. If the keyboard now operates correctly, you need to adjust the BIOS setup to disable keyboard testing during booting.

The system does not detect a PS/2 mouse.

If connecting the Local unit to a live system, connect the mouse cable to the CPU *before* keyboard connection to ensure the mouse is enabled correctly.

Issue the Mouse Recovery command.

Check that the mouse cable is connected properly and securely. Reboot the system.

The mouse pointer moves erratically.

Reset the keyboard and mouse.
Issue the Mouse Recovery command up to three times.
Ensure that you have the latest driver for your mouse.
If you are using the extender with a KVM switch, command the switch to reset the mouse.
Quit and restart the application. Reboot the PC.

When I 'hot-plug' the Local unit, the mouse no longer moves.

When connecting the Local unit to a live system, connect the mouse cable to the CPU before keyboard connection to ensure the mouse is enabled.

Try issuing the Mouse Recovery command.

Some of the mouse buttons don't work.

The PS/2 Micro Extender units support standard 2/3-button mice (with or without a wheel). Additional buttons will not operate.

I have an enhanced keyboard with extra keys and indicators. Everything works apart from these additional features.

As standard, the extender only emulates a generic PS/2 keyboard. To support other keyboards (or cascaded KVM switches), special firmware offering a *transparent mode* may be required. Please contact Technical Support to discuss your application.

6.3 Audio

The audio is very quiet.

The audio I/O is line-level and requires amplified speakers and connection to devices providing line-level I/O.

The audio is loud but distorted.

Check that the audio input is not greater than line level (4V peak-to-peak). The KVM extender accepts line-level audio input only.

The microphone output is barely audible.

See **Appendix E: Audio/Serial Ports**, page 47.

6.4 Serial

My serial device does not function.

The extender supports serial devices at data rates not exceeding 19.2K Baud (although 38.4K operation might be possible with certain equipment).

Check the type of flow control used by the device and CPU. The extender supports RTS, CTS, DTR, and DSR. Some systems may require a wiring adapter to transfer RI and DCD.

Attach the device directly to the serial port on the PC and test whether the problem is a PC or extender problem.

Some serial devices cannot be hot-plugged. Try connecting the device to a powered Remote unit prior to booting the system.

6.5 General Questions

Is it possible to use a cable length longer than 150ft (50m)?

It might be possible to use a cable of up to 300ft (100m) at lower resolutions. However, we do not recommend this and cannot guarantee the video quality.

Can extenders be daisy chained?

In certain circumstances, it is possible to cascade extenders, though we do not recommend doing so. Careful consideration needs to be given to extender setup, and the electrical environment. If you plan to cascade extenders, please contact Technical Support.

Which interconnection cable is best?

In electrically 'quiet' environments, UTP cable will give the best quality video over long distances because it has less capacitance per unit length. However, STP/FTP is usually better in electrically noisy environments, because it resists interference more strongly (if it is installed correctly!) and limits ground potential differences.

Can the extender system be used between buildings?

No. Ground loops could damage the extender system and attached equipment.

Can multiple Local/Remote units be used by swapping the interconnection cable?

Local units provide full keyboard and mouse emulation, so it is possible to swap or switch the Local-Remote interconnection to create a KVM matrix-switch system. Sometimes you may need to reset the keyboard and mouse (by entering the appropriate command) after a swap or switch. Please call Technical Support before deploying such a system.

Can the extender be connected into our network?

Absolutely not. Regardless of the cable similarities, the data signals and voltages used by the extender are different from those used by Ethernet and other types of networks. Connecting the extender to a LAN hub, switch, repeater, or other network device, or exposing it to the signal levels present on network data lines may damage the extender and other devices.

Appendix A: Example Applications

This section illustrates three specific applications using Extender units:

- Six dual-monitor consoles with serial and audio extension (Figure 7). Requires six ACUMRA02A Remote units and ACU1006VRA and ACU1006RA Local Hubs.
- Remote serial touch screens with Local access through a KVM switch (Figure 8). Requires two ACU3228A kits.
- Extender system with second screen for security monitoring (Figure 9). Requires one ACU3201A kit.

For more specific information about these, or any other complex applications, please discuss suitable extension architecture with your Technical Support.

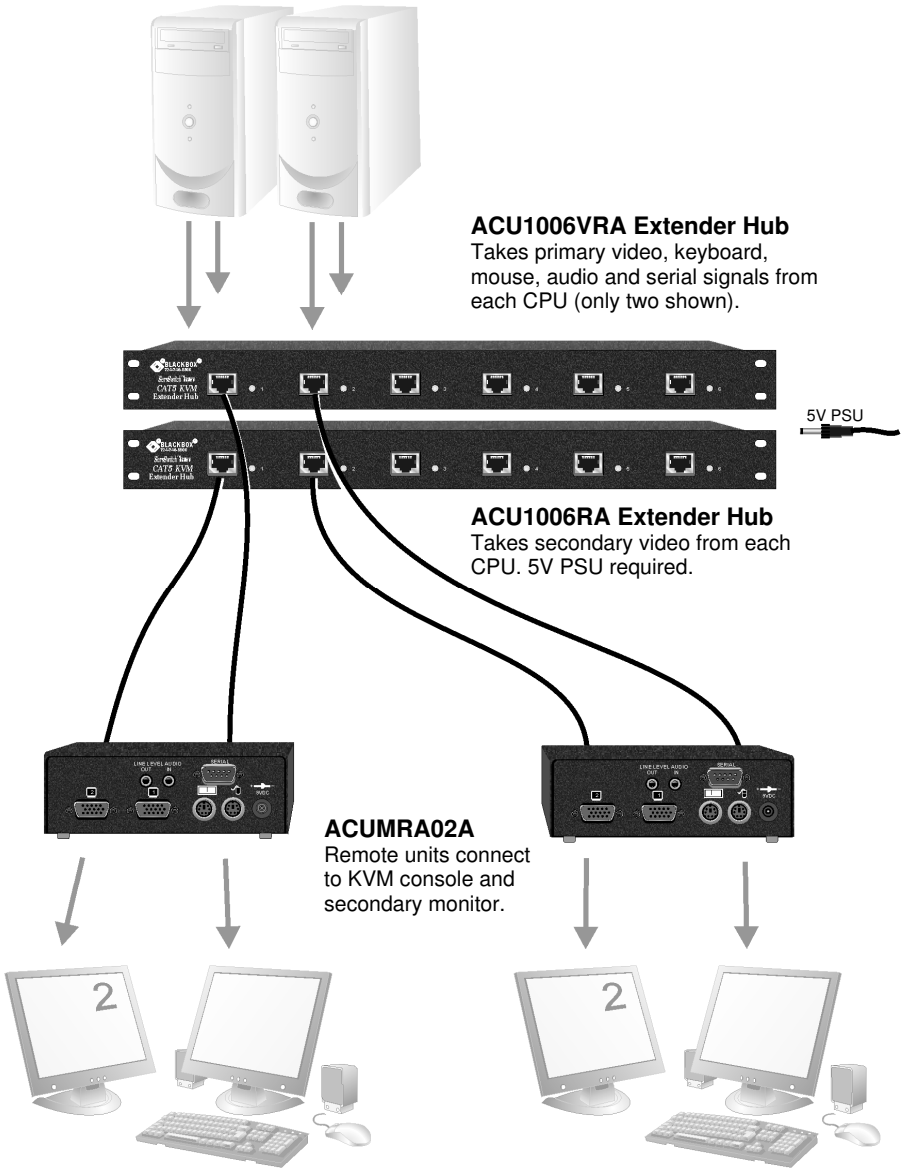

ACU1006VRA Extender Hub
Takes primary video, keyboard, mouse, audio and serial signals from each CPU (only two shown).
5V PSU
ACU1006RA Extender Hub
Takes secondary video from each CPU. 5V PSU required.
ACUMRA02A
Remote units connect to KVM console and secondary monitor.
2
2

Figure 7 **Dual-monitor consoles with serial and audio extension**

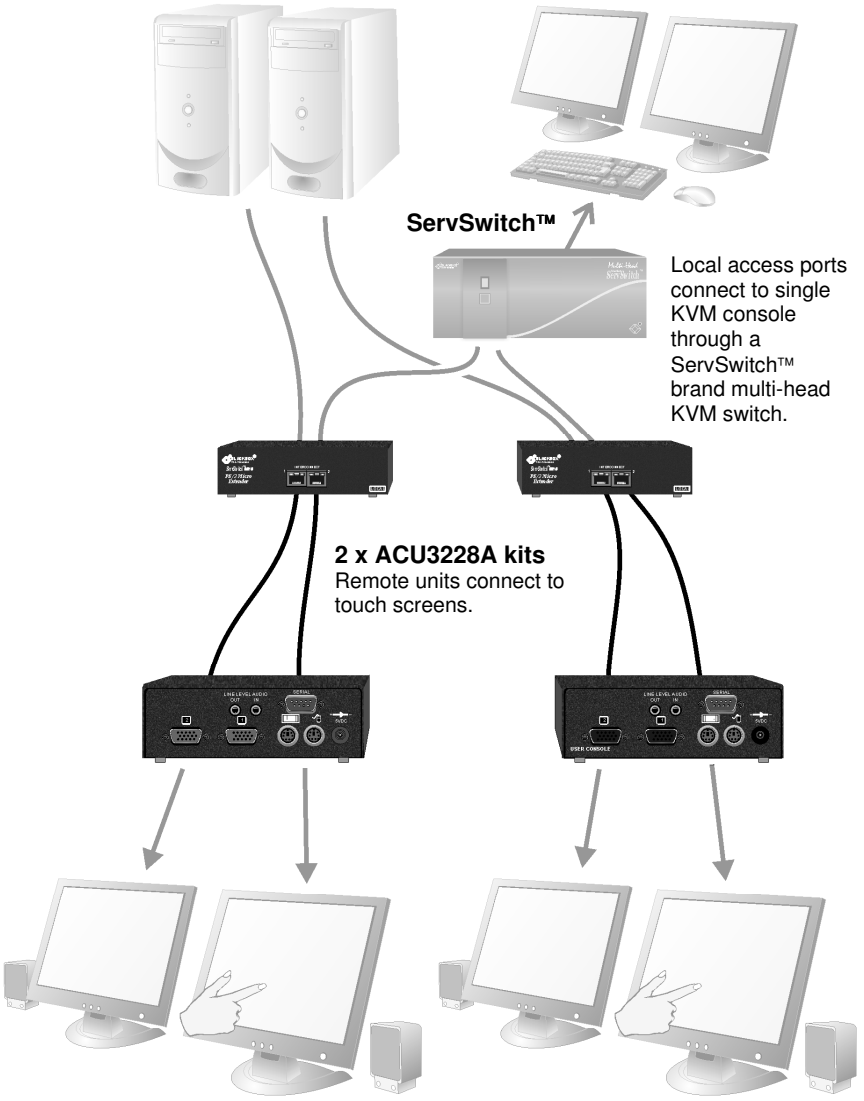

ServSwitch™
Local access ports connect to single KVM console through a ServSwitch™ brand multi-head KVM switch.
2 x ACU3228A kits
Remote units connect to touch screens.

Figure 8 **Touch screen network with local access to CPU through KVM switch**

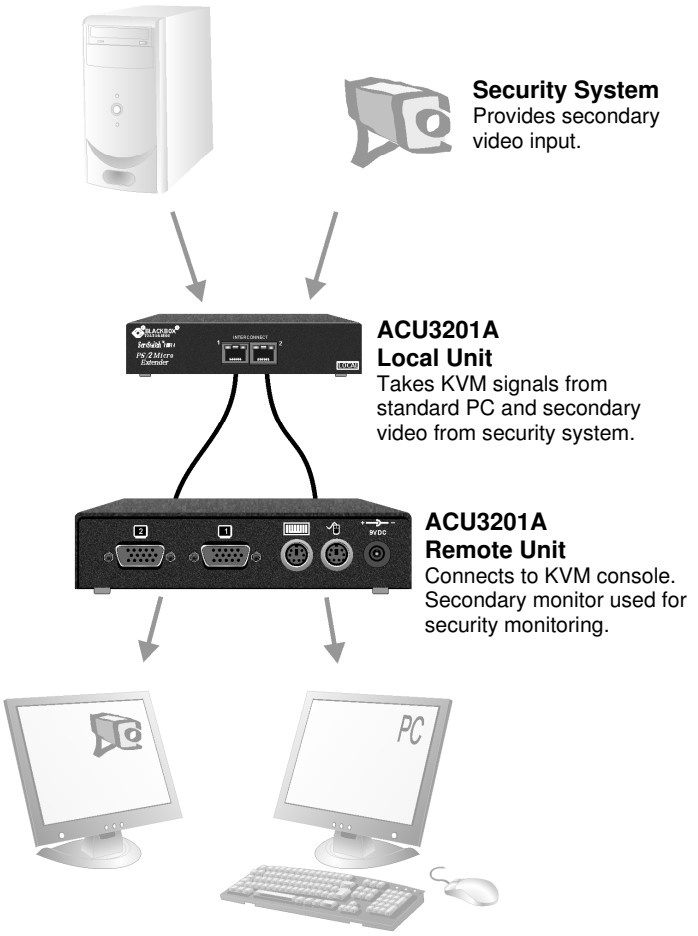


Figure 9 **Extender system using ACU3201A kit with second screen for security monitoring**

Appendix B: RMK19U-X3 Mounting Kit

Up to three extender units, in any combination, can be mounted in a 19” rack using the RMK19U-X3 mounting kit.

The kit contains one rack plate and M3 countersunk mounting screws.

To mount a unit:

1. Remove the feet from the extender unit.
2. Align the holes on the base plate with the vacant screw holes on the base of the extender unit.
3. Fasten the base of the unit to the plate of the mounting kit using the supplied screws.

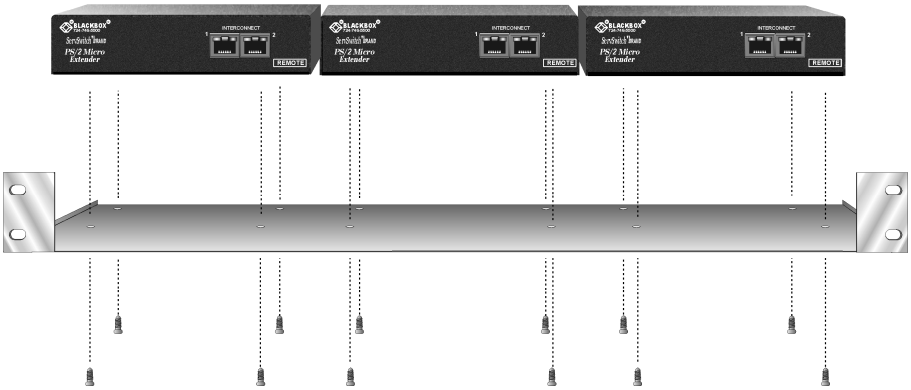


Figure 10 RMK19U-X3 Mounting Kit

Appendix C: Flash Upgrading & External Configuration

Each extender unit contains a service port. This can be accessed through the mouse port on a Remote unit or through the 25-way D-connector on a Local unit. By attaching an upgrade cable between the appropriate port and the serial port on any PC (or laptop) a unit's firmware may be upgraded.

To operate the configuration port, you need:

- A laptop or PC close to the extender unit running Windows 98 or above. The extender unit only has to be powered.
- An upgrade cable connected between the Extender's service port and the laptop or PC's serial port (Part No: ACUFLH-R2).
- A software utility called 'ConfigXt'.
- The firmware upgrade file.

The application, detailed instructions and firmware upgrades may be downloaded online. Please consult Technical Support for details on how to do this.

Appendix D: Cable Pinning

The following table illustrates which RJ45 connector pins the extenders use for various signals. It also details the standard EIA-568B wiring scheme that is recommended for most installations.

Looking into the RJ45 socket on a *Remote unit*, Pin 1 is on the right and Pin 8 on the left.

Pin	***Color (EIA-568B)***	***Signal***
1 2	White/Orange Orange/White	Blue Video
3 6	White/Green Green/White	Green Video
4 5	Blue/White White/Blue	Red Video
7 8	White/Brown Brown/White	Data

Using a crossover cable (at each end) will put the green video on the orange colored pair and the blue video on the green colored pair.

EIA-568A wiring can also be used. Contact Technical Support for details.

Appendix E: Audio/Serial Ports

Operation & Multi-Port Configuration

This appendix describes audio & serial interface operation for those models that have this feature:

- ACU3222A
- ACU3228A
- ACUMRA02A

These extender products contain daughter boards that allow bi-directional stereo audio and a full-duplex serial data link to be sent across the CATx interconnection cable in addition to PS/2 keyboard, mouse and video.

Serial Interface - Set Up and Operation

No setting up or user adjustments are required. Please note that on dual access Local units, the serial link is always active.

The Remote unit's serial port is wired as DTE - the same as that on a PC. To connect a serial printer or other DTE (rather than DCE device) to the Remote unit, you will need a Null-Modem crossover cable between the Remote unit and the printer. Select Xon/Xoff software flow control on the printer and PC.

A serial touch screen may be plugged directly into the Remote unit.

Serial Interface – Handling Multiple Serial Devices

The extender's serial interface transmits/receives six signals (3 signals in each direction).

Normally, four of these signals are used for hardware handshaking (in addition to TX & RX). However, because each handshaking line can support signals up to 19,200 Baud it is possible to configure the serial interface to handle up to three simple 2-wire (Tx/Rx only) serial links.

To do this, you will need to construct a custom breakout cable. Please contact Technical Support for further information.

Audio Interface - Set Up and Operation

The audio interface is line-level and is designed to take the output from a sound card (or other line-level) source and be connected to a set of powered speakers at the other end of the link.

Stereo audio may be transmitted either way across the link (simultaneously).

No setup is required unless a microphone is connected to the Remote unit.

Connect the extender as follows:

- Take the line-level output from your sound card (green connector) and connect to 'Line In' on the Local unit.
- Connect 'Line Out' on the Remote unit to a set of powered speakers.

Audio Interface – Using a Microphone

A microphone may be plugged into the 'Line In' connector on the Remote unit.

There are two ways of setting up a microphone:

- The Local unit's 'Line Out' connection should normally be wired to the microphone input (Pink) on your sound card. The sound card should then be set up to provide additional amplification (+17dB). This is the preferred connection method.
- Alternatively, the Remote unit itself can provide microphone amplification. To set this, open up the Remote unit and locate the jumper labeled 'MIC' on the daughter board. Connect this jumper across the pins. The Local unit's 'Line Out' connection should then be wired to 'Line In' (Blue) on your sound card.

If your microphone is already amplified, follow the second method but DO NOT install the amplification jumper in the Remote unit.

Appendix F: Calling Black Box

If you determine that your PS/2 Micro Extender is malfunctioning, ***do not attempt to alter or repair it***. It contains no user-serviceable parts. Contact Black Box Technical Support at 724-746-5500.

Before you do, make a record of the history of the problem. We will be able to provide more efficient and accurate assistance if you have a complete description, including:

- The firmware-revision level printed on the bottom of the Extender (very important, especially for keyboard and mouse problems); The KVM extender's firmware revision level:
  Version Number Format: *xxSyy/zz*
  xx is the hardware revision number
  yy is the firmware revision number
  zz is the auxiliary revision number.
- The nature and duration of the problem.
- When the problem occurs.
- The components involved in the problem—that is, what type of computers, what type of keyboard, brand of mouse, make and model of monitor, type and make of CATx cable, etc.
- Any particular application that, when used, appears to create the problem or make it worse.
- The results of any testing you've already done.

To solve some problems, it might be necessary to upgrade the Extender's firmware. If this turns out to be the case for your difficulty, our Technical Support technicians will arrange for you to receive the new firmware and will tell you how to install it.

Shipping and Packaging

If you need to transport or ship your PS/2 Micro Extender:

- Package it carefully. We recommend that you use the original container.
- If you are shipping it for repair, please include the Remote Unit's external power supply. If you are returning it, please include everything you received with it. Before you ship the Extender back to Black Box for repair or return, contact us to get a Return Authorization (RA) number.

Appendix G: Specifications

Video

Maximum Resolution	1600x1200@75Hz up to 150ft (50m) Operation at higher resolutions/refresh rates may be possible at shorter distances
Video Compatibility	VGA to UXGA, RGB
Video I/O	0.7V P-P
Video Compensation	2 ranges: 15-75ft (5-25m) or 75-150ft (25-50m) selected by keyboard command.
Video Coupling	DC
Sync I/O	Separate/Composite TTL Level Sync Polarity is preserved
VESA DDC	Emulated DDC for each video channel Local Unit reports as universal monitor capable of all standard resolutions and refresh rates. DDC information may be disabled, flash-upgraded or read from remote monitor(s).
Video Input Connectors	DB25 female (CPU KVM; Video 1), HD15 male (Video 2)
Video Output Connectors	HD15 female

Keyboard and Mouse

Keyboard Compatibility	All standard keyboards
Mouse Compatibility	2/3-button PS/2 mice Standard wheel mice
KB/Mouse Connectors (CPU)	DB25 (Female) (Keyboard, Mouse and Video 1)
KB/Mouse Connectors (Device)	6-Pin MiniDIN Socket

Serial Interface

Max Baud Rate Supported	19.2K Baud
Serial Data Format	Transparent
Signals Transferred	TX, RX, RTS, CTS, DTR, DSR
Local Unit Connector	DB9 Female (DCE)
Remote Unit Connector	DB9 Male (DTE)

Audio Interface

Description	Bi-directional stereo audio link
Transmission method	Digitized virtually CD quality audio (16-bit, 38.4kHz)
Signal levels	Line level (4 Volts Pk-Pk maximum)
Input Impedance	47kΩ
Local Unit Connectors	2x3.5mm stereo jack socket (Line In & Line Out)
Remote Unit connectors	2x3.5mm stereo jack socket (Line/Mic In & Line Out)
Microphone Support	Microphone may be connected to Remote Unit Pullup resistor provides bias for condenser microphone Option to set microphone amplification to +17dB

Power Requirements

Local Unit	5V at up to 250mA supplied by CPU. Connector for optional 5V PSU. 2.1mm DC Jack, center positive. Overvoltage protection: unit switches off if a PSU >5.6V is connected.
Remote Unit	5V DC, 0.75A (max) 2.1mm DC jack, center positive. Overvoltage protection: unit switches off if a PSU >5.6V is connected.
Remote Unit Power Supply	5V DC, 4A (20W) (certified to all relevant safety standards) Universal IEC Input 2.1mm DC jack, center positive.

Size and Shipping Weight

ACU3201A	Local Unit: 5.7”x3.9”x1.1” (145x100x29mm) Remote Unit: 5.4”x3.9”x1.1” (138x100x29mm) Shipping Weight: 4.2lb (1.9kg)
ACU3222A	Local Unit: 5.7”x3.9”x1.7” (145x100x44mm) (1U) Remote Unit: 5.4”x3.9”x1.7” (138x100x44mm) (1U) Shipping Weight: 4.9lb (2.2kg)
ACU3209A	Local Unit: 5.7”x3.9”x1.7” (145x100x44mm) (1U) Remote Unit: 5.4”x3.9”x1.1” (138x100x29mm) Shipping Weight: 4.4lb (2.0kg)
ACU3228A	Local Unit: 5.7”x3.9”x1.7” (145 x100x44mm) (1U) Remote Unit: 5.4”x3.9”x1.7” (138x100x44mm) (1U) Shipping Weight: 5.1lb (2.3kg)
ACUMR02A	Remote Unit: 5.4”x3.9”x1.1” (138x100x29mm) Shipping Weight: 2.4lb (1.1kg)
ACUMRA02A	Remote Unit: 5.4”x3.9”x1.7” (138x100x44mm) (1U) Shipping Weight: 2.6lb (1.2kg)

Environmental

Operating Temperature	0 to 40 °C
Storage Temperature	-30 to 65 °C
Relative Humidity	5-90% non-condensing
Chassis Construction	Fully shielded. Black painted steel

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